

A committee of representatives from the Materials Science, Physics, and High Energy Physics divisions has been seeking opportunities for a joint project or suite of projects that would constitute a lab-wide initiative in astrophysics. We have reviewed the current programs in each division, identified common areas of scientific interest, and surveyed new and ongoing experimental projects.

The most promising science theme that combines existing expertise and facilities at Argonne, common interests among divisions, possibilities for growth, and national scientific priority, is supernova science, including its roles in constraining dark energy and in the origin of the elements. Experiments being developed in the larger community will produce supernova data sets orders of magnitude larger than currently available within the next decade. Effective use of those data to constrain dark energy will depend on understanding both observational systematics and the properties of thermonuclear supernovae. The data will also provide important constraints and tests for models of multiple types of supernovae. Nucleosynthesis in several environments, including supernovae, is already a focus of both experimental and theoretical activity at Argonne. The astrophysics initiative will build up and extend these efforts so that astronomical, accelerator, and meteoritic measurements combine with theoretical work to make Argonne a recognized center for supernova science.

We propose to spend the next year defining the program and resolving issues that the committee has been unable to resolve. Ultimately, we want to find synergistic ways to build up existing efforts along with a major new experimental project involving HEP Division. This will depend on opportunities to join experiments that have been initiated elsewhere, or to identify areas where we can get in from the beginning. Identifying our best opportunity will depend on both outside factors – like the recommendations of the DOE Dark Energy task force and the availability of roles in major collaborations – and the more internal process of learning enough about science opportunities (not necessarily pre-existing projects) to match them with local strengths. Opportunities to link this effort with potential nearby collaborators like the Flash Center also need more investigation.

We propose several new programs for the next year, beginning this summer. Bringing in visitors and hosting workshops will raise our visibility and make our options clearer. A seminar series in astrophysics with funding for outside speakers, as well as funds for travel by committee members, will also serve these goals. Including an outside advisory committee to help identify visitors, we estimate that these programs need a total of \$30K in FY06 and \$180K in FY07.

In addition to seminar and visitor programs, we envision hiring post-docs, and/or junior staff, in each division in the second half of FY07, as well as initiating a new experimental effort. New hires in FY07 and FY08 will carry out much of the expanded effort. We estimate that these hires will require \$240K in FY07. M&S and equipment funds in FY07, totaling \$150K, will support the new experimental initiative, as well as supporting the related work of the lab's first named fellow in astrophysics.

The second fiscal year of a new initiative will complete the expansion in manpower. The seminar series, visitor program, and workshops will continue. Significant M&S and equipment funds for new experimental programs will be required in the second and third years. Salaries, M&S, and equipment funds in these two years is expected to be \$1.5M per year.

Argonne has an opportunity to become a recognized center for supernova studies, combining astrophysical observations, theoretical studies, and accelerator and meteoritic measurements to constrain supernova models, the origin of elements, and the evolution of dark energy in the universe.